REMARKS

The Applicant has now had the opportunity to carefully consider the remarks set forth in the Office Action mailed May 15, 2006. All of the rejections are respectfully traversed. Amendment, reexamination and reconsideration are respectfully requested.

The Office Action

In the Office Action mailed May 15, 2006:

the specification was objected to for including the phrase "in-line";

claims 1-15 were rejected under 35 U.S.C. 102(a) as being anticipated by A Unified Turbo/Viterbi Channel Decoder for 3GPP Mobile Wireless in 0.18-µm CMOS by Bickerstaff, et al. (hereinafter "Bickerstaff02"); and

the rejection of **claim 6** under 35 U.S.C. 112, second paragraph, was maintained (Response to Arguments section, page 2 of the Detailed Office Action).

The Specification has been Corrected

The Office Action asserted that the phrase "**in-line**" should be changed to "in-place" in page 8, line 24; page 13, line 30; and page 18, lines 1, 12 and 17. However, the correction to page 8, line 24, was made in the previous amendment (Applicant's Amendment A), which was mailed March 14, 2006.

Corrections to the indicated portions of page 13 and page 18 are made herein.

Additional clarifying amendments to the paragraph on page 13 beginning on line 30 and ending on line 31 are also presented herein. It is respectfully submitted that support for the clarifying amendments can be found throughout the present application.

The Present Application

By way of brief review, the present application is directed toward methods of decoding and decoders. The methods include using an in-place addressing technique. The decoders include a soft-input-soft-output (SISO) device. For example, in embodiments of the decoder, the SISO device operates as a parallel concantenated convolutional code (PCCC) decoder in a first mode of operation and as a serial concantenated convolutional code decoder in a second mode of operation. The in-place addressing technique (e.g., paragraphs 18-38, page 18, line 6 - page 11, line 23) allows a single SISO architecture to handle any convolutional code associated with any

number of trellis states. That is, the claimed decoder can implement any radix turbo code having 2^{K-1} number of states for any K.

As a result, a decoder including a single SISO of the disclosed and claimed architecture can act as an inner SISO of an SCCC at a first point in a decoding process and act as an outer SISO of the SCCC in a second point in the decoding process. Additionally, the flexibility provided by the in-place addressing technique allows the device to process data according to a first trellis size when operating as the inner SISO and according to a second trellis size when operating as the outer SISO. Furthermore, as indicated above, the single SISO may operate as a first SISO of a PCCC decoder at a first point in a parallel decoding process and as a second SISO of the PCCC decoder at a second point in the parallel decoding process (e.g., paragraph 58, page 15, line 26 – page 16, line 8).

The Cited Reference

In contrast, it is respectfully submitted that Bickerstaff02 does not disclose or suggest an in-place addressing technique in the context of turbo decoding. Futhermore, Bickerstaff02 does not disclose or suggest an SISO device that operates as a PCCC decoder in a first mode of operation and as an SCCC decoder in a second mode of operation. For example, while Bickerstaff02 mentions a parallel concantenated convolutional code specified in the 3GPP documentation (page 1556, C. Turbo Decoding), it is respectfully submitted that Bickerstaff02 does not mention serial concantenated convolutional code (SCCC). Bickerstaff02 depicts a 3GPP turbo interleaver address processor architecture (FIG. 9) and a 3GPP turbo interleaver address pruning (e.g., FIG. 10). However, it is respectfully submitted that Bickerstaff02 does not disclose or suggest the in-place addressing technique disclosed and claimed in the present application **in the context of turbo decoding** (e.g., page 8, line 6 - page 11, line 23).

The Claims are not Anticipated

Claims 1-15 were rejected under 35 U.S.C. 102(a) as being anticipated by Bickerstaff02. In support of the assertion that Bickerstaff02 discloses the decoder recited in **claim 1**, the Office Action directs the attention of the Applicant to page 1557, Section A, Viterbi Mode, line 3, and Section B, Turbo Mode, lines 40-51.

However, while line 3 of Section A includes the words "in-place" in the context of a programmable in-place path metric updating approach in association with a description of a Viterbi algorithm, it is respectfully submitted that Bickerstaff02 does not disclose, suggest or enable the in-place addressing technique disclosed and claimed in the present application in the context of turbo decoding (page 8, line 6 - page 11, line 23).

It is respectfully submitted that Section B. Turbo Mode, lines 40-51, indicates that received samples corresponding to an information bit are not contiguous, so data can only be read by the decoder core at a rate of one received sample per clock cycle. This memory bandwidth is not sufficient to directly satisfy the decoder input bandwidth requirement in turbo mode. During the first phase of a decoding operation (D1), the parallel α and dummy-β calculations require four received samples per clock cycle and the second phase backward recursion requires two samples per clock cycle. During the second decoding operation (D2), only the parity bits are required (not systematic bits), giving a phase one requirement of two received samples per clock cycle and a phase two requirement of one received sample per clock cycle.

It is respectfully submitted that lines 40-51 of Section B of Bickerstaff02 do not disclose, suggest or enable the in-place addressing technique disclosed in the present application (page 8, line 6 - page 11, line 23) for use in implementing a **turbo mode** or a turbo decoder.

Furthermore, the cited portions of page 157, taken alone or in combination, do not disclose or suggest an SISO device that operates as a PCCC decoder in a first mode of operation and as an SCCC decoder in a second mode of operation.

For at least the foregoing reasons, **claim 1**, as well as **claims 2-11**, which depend therefrom, is not anticipated and is not obvious in light of Bickerstaff02.

It is noted that **claim 4** was incorrectly amended in Applicant's Amendment A. Accordingly, **claim 4** is being amended to remove the reference to a second mode of operation that was added in Applicant's Amendment A.

Regarding **claims 4** and **5**, the Office Action directs the attention of the Applicant to page 1557, lines 35-38, in support of the assertion that Bickerstaff02 discloses the subject matter of both claims. However, it is respectfully submitted that even if Bickerstaff02 could be construed as disclosing a single SISO device operating as different SISOs at different time periods, it is respectfully submitted that the explanation

that "during the backward recursion of the D2, the decoder soft output is used in the computation of a BER estimate and decoded output bits are written to the OB" found at page 1557, lines 35-38, which was cited by the Office Action, cannot be fairly construed as disclosing both an SISO operating as a PCCC decoder and operating in that mode as a first SISO during one time period and as a second SISO during a second time period, as recited in **claim 4**, and an SISO operating as an SCCC decoder, and in that mode, operating as an inner SISO during one time period and as an outer SISO during a second time period as recited in **claim 5**. Moreover, Bickerstaff02 does not disclose a SCCC device of any kind.

For at least the foregoing reasons, it is respectfully submitted that **claim 5** is not anticipated by Bickerstaff02.

Regarding **claim 6**, the Office Action directs the attention of the Applicant to the Abstract of Bickerstaff02. However, it is respectfully submitted that the Abstract of Bickerstaff02 does not disclose or suggest an SISO device operating as an SCCC decoder and as an inner SISO during one time period whereby it processes information as per an N_1-state Radix-K trellis and operates as an outer SISO during another time period whereby it processes information as per an N_2-state Radix-K trellis where N_1 may or may not be equal to N_2 and K, N_1 and N_2 are integers equal to 1 or greater. Clarification is respectfully requested.

For at least the foregoing additional reasons, **claim 6** is not anticipated by Bickerstaff02.

With regard to **claim 7**, the Office Action directs the attention of the Applicant to any of FIGS, 4, 5 or 7 in Bickerstaff02.

However, even if the cited portions of Bickerstaff02 could fairly be construed as disclosing the subject matter suggested by the Office Action, it is respectfully submitted that **claim 7** depends from **claim 1**, which recites an SISO device that can operate in PCCC mode and SCCC mode, and Bickerstaff02 does not disclose or suggest such a device.

For at least the foregoing additional reasons, **claim 7** is not anticipated by Bickerstaff02.

In regard to **claim 8**, the Office Action directs the attention of the Applicant to Section C, a turbo decoding, on page 1556 of Bickerstaff02.

However, **claim 8** recites --when operating as an SCCC turbo decoder. It is

respectfully submitted that the cited portion of Bickerstaff02 does not disclose or suggest serial concantenated convolution code (SCCC). Instead, the introductory sentence of the cited paragraph indicates that turbo decoding is an efficient method of decoding the parallel concantenated convolution code (PCCC) specified in the 3GPP documentation. Additionally, it is respectfully submitted that the cited portion of Bickerstaff02 does not disclose or suggest an N_1 state Radix-K first trellis and an N_2 state Radix-K second trellis where N_1 is not equal to N_2 and where N_1 and N_2 are integers equal to 2 or greater and K is an integer equal to 4 or greater. Clarification is respectfully requested.

For at least the foregoing additional reasons, **claim 8** is not anticipated and is not obvious in light of Bickerstaff02.

Claim 9 has been amended to correct antecedence. With regard to **claim 9**, the Office Action again directs the attention of the Applicant to Section C, a turbo decoding, page 1556 in Bickerstaff02. However, as indicated above, it is respectfully submitted that the cited portion of Bickerstaff02 does not disclose or suggest N_1 is equal to N_2 and K is an integer equal to 4 or greater and N_1, N_2 are integers equal to 2 or greater. Clarification is respectfully requested.

For at least the foregoing additional reasons, **claim 9 is** not anticipated and is not obvious in light of Bickerstaff02.

Regarding **claims 10** and **11**, the Office Action directs the attention of the Applicant to page 8, lines 6-14, of the present application and characterizes this portion of the specification as Applicant admitted prior art. However, **claims 10** and **11** depend from **claim 1** and are patentably distinct for at least that reason.

By way of explanation regarding the rejection of **claim 12**, the Office Action directs the attention of the Applicant to Section B, turbo decoding, page 1557 in Bickerstaff02. However, **claim 12** has been amended to recite processing, in accordance with a turbo decoding algorithm, receiving information as per an N state Radix-K trellis using an in-place addressing technique where N, K are integers equal to 1 or greater. Even if Bickerstaff02 suggests in-place addressing in the context of a Viterbi mode or algorithm, it is respectfully submitted that Bickerstaff02 does not disclose or suggest an in-place addressing technique used in accordance with a turbo decoding algorithm.

Claims 13 and **14** depend from **claim 12** and are patentably distinct and are not

obvious for at least that reason.

For at least the foregoing reasons, **claims 12-14** are not anticipated and are not obvious in light of Bickerstaff02.

Claim 15 has been amended to recite, *inter alia*: a soft input/soft output device in communication with the interleaver and the deinterleaver, the soft input/output device being operative to use an in-place addressing technique when processing path metric data related to each of the states of a trellis in accordance with a turbo decoding algorithm. Arguments similar to those submitted in support of **claims 1** and **12** are submitted in support of **claim 15**. Bickerstaff02 does not disclose or suggest an SISO device operative to use an in-place addressing technique when processing path metric data in accordance with a turbo decoding algorithm.

For at least the foregoing reasons, **claim 15** is not anticipated and is not obvious in light of Bickerstaff02.

The Claims Meet the Requirement of 35 U.S.C. 112

Claim 6 was rejected under 35 U.S.C. 112 for including the phrase "may or may not."

However, it is respectfully submitted that the phrase "may or may not" as used in **claim 6** of the present application, is not indefinite. It is respectfully submitted that the phrase "may or may not" makes it clear that N_1 and N_2 can have the same or different values. Furthermore, it is respectfully submitted that without the phrase "may or may not", the use of the different names (N_1 and N_2) may be wrongly construed to imply that the values they represent are different, and this is not necessarily the case.

Furthermore, it is respectfully submitted that claims that include the phrase "may or may not" have been allowed by the U.S. Patent and Trademark Office. For example, **claim 6** of U.S. Patent No. 6,512,854 to Mucci, et al., which issued on January 28, 2003, recites "the method as recited in claim 1, wherein step a) derives said first region value for a pixel by calculating an average value of pixel values in an N x M matrix of pixels, including said subject pixel, where N and M are integers and **may or may not** be equal in value."

Claim 1 of U.S. Patent No. 7,068,895 to Kuejpers, et al., which issued on June 27, 2006, recites, *inter alia*: ii) forming a plasma in the quartz substrate tube to bring about a reaction so as to form glass layers, which **may or may not** be doped."

Indeed, a recent search in the U.S. patent collection for patents including the phrase "may or may not" in a claim uncovered **972 U.S. patents that include** the phrase "**may or may not**."

For at least the foregoing reasons, it is respectfully submitted that **claim 6** meets the requirements of 35 U.S.C. 112 and withdrawal of the rejection to **claim 6** thereunder is respectfully requested.

Telephone Interview

In the interests of advancing this application to issue the Applicant(s) respectfully request that the Examiner telephone the undersigned to discuss the foregoing or any suggestions that the Examiner may have to place the case in condition for allowance.

CONCLUSION

Claims 1-15 remain in the application. **Claims 1**, **4**, **9**, **12** and **15** have been amended. For at least the foregoing reasons, the application is in condition for allowance. Accordingly, an early indication thereof is respectfully requested.

Respectfully submitted,

FAY, SHARPE, FAGAN,
MINNICH & McKEE, LLP

August 25, 2006
Date

Joseph D. Dreher, Reg. No. 37,123
Thomas Tillander, Reg. No. 47,334
1100 Superior Avenue
Seventh Floor
Cleveland, Ohio 44114-2579
216-861-5582

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